

EXHIBIT: MATERIAL SCIENCE

ACTIVITY: What's in Our Water?

How do contaminants affect our drinking water?



DISCOVER

You will create a small farmland and coastline, and students will observe how contaminants travel through the groundwater. Students will then create a well and observe the purity of its drinking water.

MATERIALS

Each station needs:

- Plastic or glass container approx. 16" wide x 12" deep x at least 6" high
- 4-5 cups of gravel
- Food coloring (any color)
- Water
- 1 squirt bottle with removable top

- 1 straw
- 1-2 paper towels

Optional materials:

- 2 cups sand
- Fake turf
- Hot cocoa powder

Grades: 8th-12th

Group Size: 5 students per station or one demonstration in front of 30 students

Time: 15-30 minutes

Utah Core Curriculum:

- 8th Science 1.1 b, c
- 9th Earth Science 4.1 a, b, c, d, e
- ILO 5 a

Process Skills & Higher Level Thinking Skills:

- Observing
- Questioning
- Investigating
- Comparing
- Applying
- Analyzing

PREPARE

Before class begins, follow these instructions to prepare the "farmland" and "coastline" for each group.

1. Tape a straw to the inside wall of the container.
2. Pile gravel on one side of the container (the same side as the straw), creating a coastline. If desired, pile sand on top of the gravel and place fake turf on top of the sand.
3. Add water until the water is about half as high as the gravel.

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WHAT'S GOING ON?

This demonstrates how easily a contamination can travel through a permeable layer. The spaces in between the gravel and sand allow for the contamination to get sucked up the well. In the real world, this process takes much longer because of the larger space that needs to be traveled and the tighter packing of the soil.

For more information and ideas, visit

- <http://geology.com/water>
- <http://education.usgs.gov/common/secondary.htm>
- <http://www.groundwater.org/gi/sourcesofgwcontam.html>

Below are some sources of potential water contaminants. Encourage your students to think of others.



Drilling practices, including fracking



Runoff from factories and industrial processes



Pesticides on farms

4. Place the “straw” of the squirt bottle top into the straw that you have taped to the container (so when you pump the squirt bottle, it draws water from the bottom of the container).

PONDER

- What processes or materials can contaminate our water?
- What processes are or could be used to clean up water contamination?
- How long does it take to contaminate and decontaminate groundwater?
- How is the demonstration in this activity similar to and different from real life?
- What real-life contaminants could the cocoa powder and food coloring in this activity represent?

EXPERIMENT

This activity shows how contaminants can travel from their sources to other locations, even into your drinking water.

1. Divide the students into groups of about five students each and give each group a prepared container.
2. Have the students add several drops of food coloring to the water and dirt or turf in their container. They can also sprinkle some cocoa on the turf and then spray the turf with water to simulate rain. The food coloring represents a contamination such as oil and fracking fluid and the cocoa represents pesticides from a farm.
3. After adding the contaminants, students should pump the “well” using the spray bottle top. Have them spray the well contents onto a paper towel until they begin to see the contaminants staining the towel with water from the well. It may take a few minutes.
4. Ask students to suggest ways to prevent contamination, ideas to decontaminate the system, and discuss any questions they have.

EXPAND

Experiment: Try adding a non-porous layer (such as clay) and compare how the contaminants travel through different materials.

Discuss: Discuss current events related to water contamination. Have students walk around the school or their neighborhood looking for possible contaminants (oil leaking from cars, pesticides on lawns, local factories, etc.)